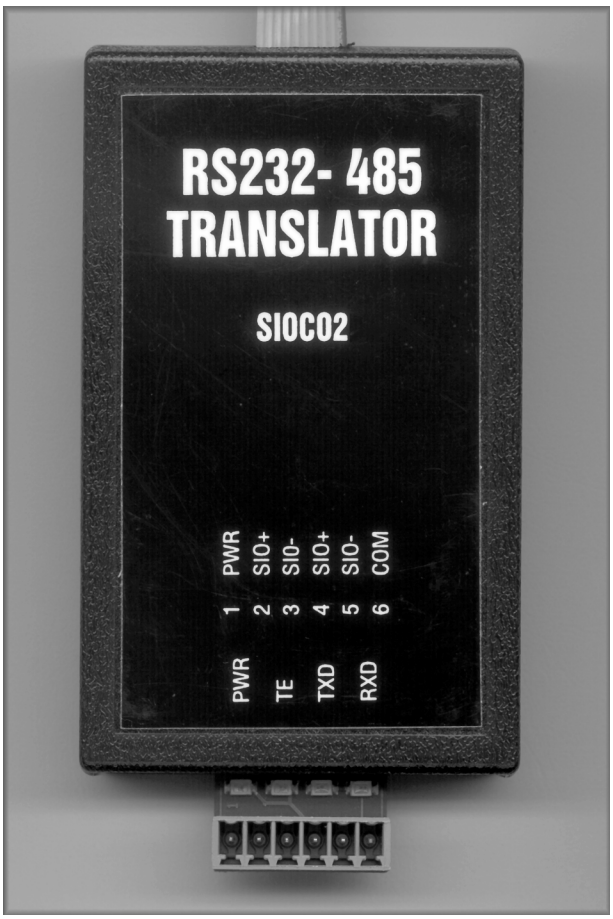
BERGES

Operating Instructions

Serial Input/Output Converter
SIOC02



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1 Introduction

1.1 Product Overview

The SIOC02 module is an optically isolated converter that converts RS232 to RS485 signals and vice-versa. The converter performs all necessary level shifting required to interface these two different communication systems.

1.2 Manual Overview

This manual contains specifications, receiving and installation instructions, configuration, description of operation, and troubleshooting procedures for the SIOC02 Serial Input/Output Converter.

2 Receiving and Installation

2.1 Initial Inspection

The SIOC02 option contains an SIOC02 converter module and two sets of hardware for connecting the 9 pin “D” shell connector.

Carefully inspect the SIOC02 for shipping damage or missing components. Report any shipping damage to your nearest BERGES representative.

2.2 Product Features & Specifications

Power supply requirements	+5 VDC or +12–24 VDC; 50 mA
Module input	RS232 for PC or PLC, 9 pin “D” shell, female
Module output	RS485 half duplex, to terminal block
Maximum baud rate	110 k bits per second (bps)
Signal Isolation	Optical, 1,000 volts
Rectified power supply input	Power supply polarity makes no difference
Break apart terminal	Allows easy replacement, if needed
Ease of installation	Simple 2 wire half duplex requires a minimal number of electrical connections per device
Common protocols	Input RS232 is available on all PCs and many PLCs. Output RS485 is common in industrial applications, providing flexibility in selection of other system components
Jumper selectable echoing	Allows disabling of echo feature for compatibility with a greater number of devices and host software
LED diagnostics	PWR – power supply is OK. TE – transmit enable is active. TxD – data is present on the transmit line. RxD – data is present on the receive line.

3 Connections

3.1 Introduction

This chapter provides information on connecting the required wiring to the SIOC02 converter.

3.2 General Wiring Information

3.2.1 Wiring Practices

Good wiring practice requires separation of low voltage wiring from all power wiring. Power from inverters and other non-linear loads contain high frequencies that may interfere with other equipment. Do not run low voltage signal wires in the same conduit or raceway with power or motor wiring. Observe general RFI suppression measures (refer to the inverter manuals (electromagnetic compatibility)).

3.2.2 Considerations for Control Wiring

All wiring associated with the SIOC02 converter module is low voltage wiring. Many of the conductors carry high frequency signals that contain the communication signals. Select this low voltage wiring as follows:

1. Shielded wire is recommended to prevent electrical noise interference from causing improper operation or nuisance tripping. Connect the shield as recommended by the equipment manufacturer.
2. Twisted pairs are recommended. The SIO+ and SIO– conductors should be twisted together. If a twisted pair is used for the power supply connection, the positive voltage and common conductors should be twisted.
3. Use only VDE, UL or CUL recognized wire.
4. Wire voltage rating must be at least 300 volts.

3.2.3 RS232 Communication Cable

It may be desirable to extend the length of the 9 pin “D” shell connector. To do this requires a straight through cable assembly (i.e pin 1 connects to pin1; pin 2 to pin 2; etc.). Mouse extension cables may not perform correctly. To assure reliability, always keep the length of this connection as short as possible, with an absolute maximum of 25 feet. The cable should be kept clear of any power signals.

3.3 Terminals Found on the SIOC02

Figure 1 shows the power SIOC02 circuit board assembly. The Table 1 describes the terminals.

Terminal	Term	Description
1	PWR	Positive input terminal for the power supply.
2 & 4	SIO+	Positive side of the SIO data.
3 & 5	SIO–	Negative side of the SIO data.
6	COM	Circuit common for the power supply input.
J12		2 mm female power supply input.

Table 1
Description of Terminals

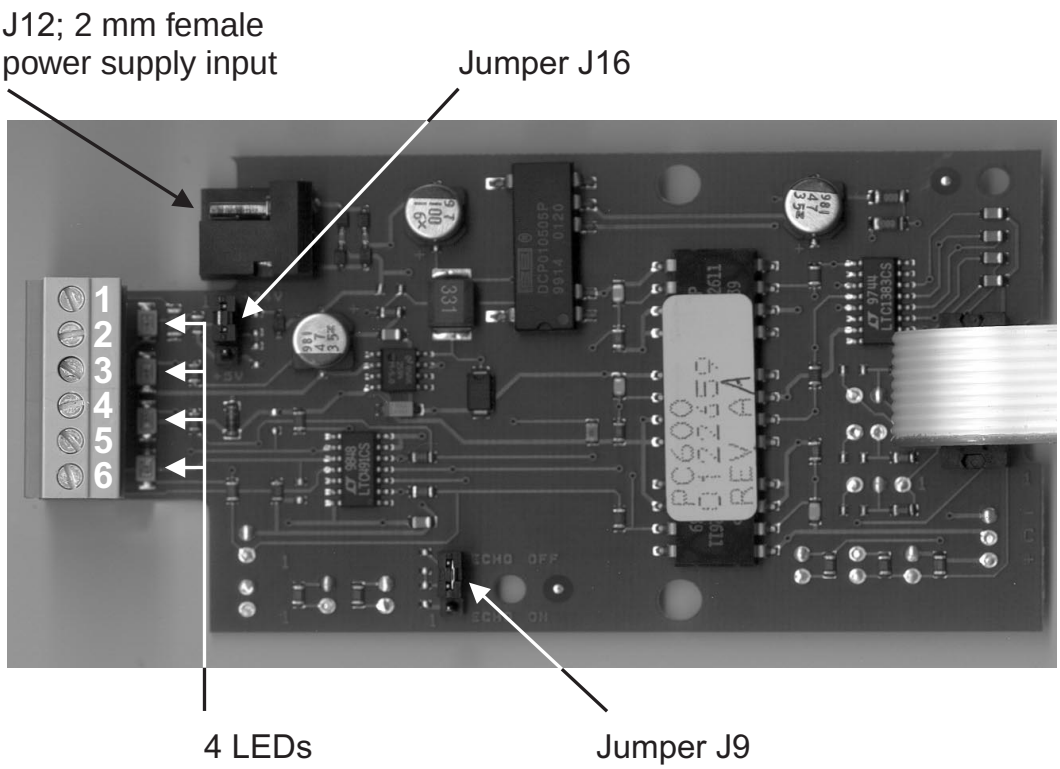


Figure 1
SIOC02 Component Location Diagram

3.3.1 Power Supply Connections

The SIOC02 converter module requires a DC power supply to operate. The voltage can be +5 VDC, or between +12 and +24 VDC. Jumper J16 must be properly configured for the correct input voltage. Refer to section 4.3 for configuration of this jumper.

When used with the “E-trAC WFC” or “WF2” series of drives, the +24 VDC can be taken from the drive's user power supply. In this case, the +24 and common terminals of any one drive in the system are connected to the V+ and COM terminals of the SIOC02. Do not, under any circumstances, connect the supply terminals of multiple devices to the SIOC02, or damage may result to those devices. Other external supplies can also be used, and are connected in the same manner.

The power supply requirement can also be met using a power supply adaptor such as BERGES part number PA24DC. Such a device must be capable of supplying +24 VDC, and capable of supplying 50 mA of current. Power from these devices can be connected to the J12 connector of the SIOC02 module. See figure 1 for the location of this connector.

3.3.2 RS233 Input Connections

The SIOC02 module is provided with a 9 pin “D” shell connector for interface with a PC, PLC, or other RS232 communication host. Hardware is also provided for securing this connector to the host device. It is strongly suggested that the connector be secured using this hardware.

If the length of the cable is adequate, and the gender of the connector are correct, the cable can be plugged directly into the desired communications port (COM Port) of the host device.

It may be necessary to convert the gender of the 9 pin “D” shell connector. Adaptors for this type of conversion are available from third party sources. Details of the signals connected to the various pins of this connector can be found in section 7.1.

If the communication host has a 25 pin “D” shell connector, an adaptor can be made or purchased from a third party. Section 7.1 provides the connection information for such an adaptor.

The length of the input cable assembly can be extended. To do this requires a straight through cable assembly (i.e pin 1 connects to pin1; pin 2 to pin 2; etc.). Mouse extension cables may not perform correctly. To assure reliability, always keep the length of this connection as short as possible, with an absolute maximum of 25 feet. The cable should be kept clear of any power signals.

3.3.3 RS485 Output Connections

The RS485 output of the SIOC02 is terminated at COM, terminals SIO+ and SIO–. The proper connection of these terminals, when connected to BERGES inverter products, is shown in figure 2. Refer to the equipment manual for other devices that you may wish to connect to the same system for correct connection.

It is strongly recommended that these connections be made with a shielded twisted pair. The SIO+ and SIO– conductors are twisted. The shield is connected to the common of either the SIOC02 module or the device that it is communicating with; but not at both ends. The end not connected should be taped back to the jacket of the cable. This is the case for each connection, as shown in figure 2.

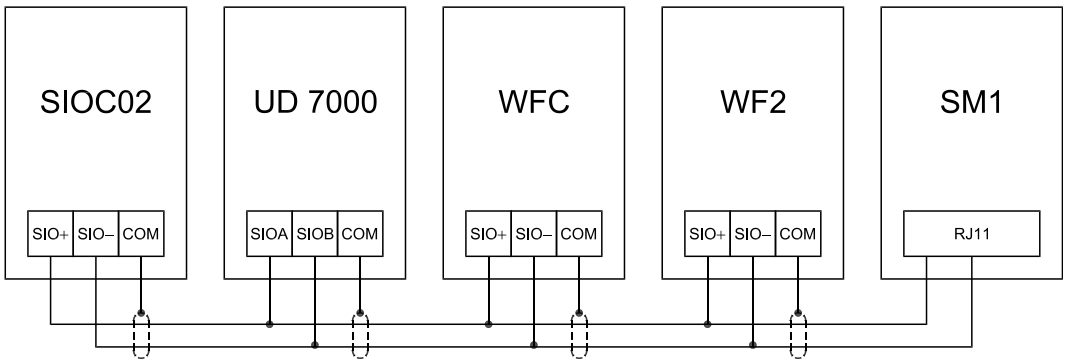


Figure 2
Typical RS485 Connections

Note that connections to the SM1 submicro inverter are established via an RJ11 phone jack. The pin assignments for the RJ11, and the cable requirements for connecting this drive to the SIOC02, are shown in section 7.2.

4 Configuration

4.1 Introduction

This chapter provides information on setting the configuration jumpers in the SIOC02 module.

4.2 Gaining Access to the Configuration Jumpers

The case of the SIOC02 is removed by removing the two screws located on the bottom of the enclosure. See figure 3 for the location of these screws.

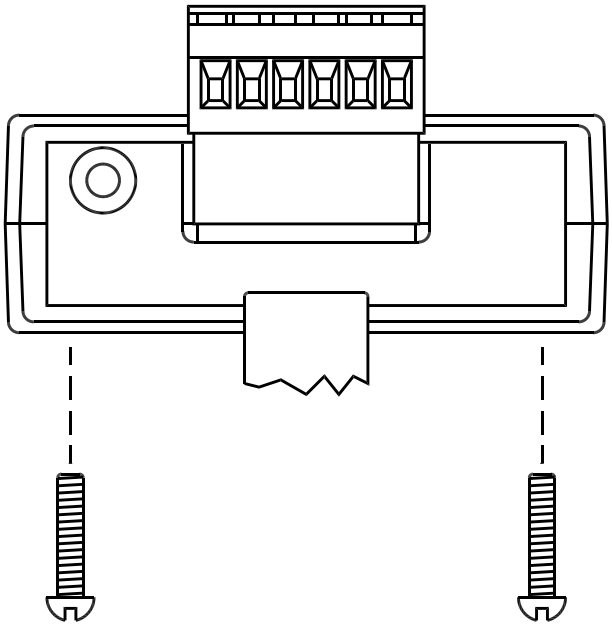


Figure 3
Enclosure Screw Location

When replacing the cover, assure that the ribbon cable for the RS232 connection is routed correctly and is not being pinched. The screws should not be tightened in excess of 6 in-lb, or damage may result to the enclosure.

4.3 Power Supply Selection

Jumper J16 configures the SIOC02 module for the DC power supply voltage that is being provided. The default setting for this jumper is +12 to +24 VDC. Refer to table 2 for the selection relevant to your application. Figure 4 provides the location of the jumper.

Jumper J16	Selection
1-2	+12–24 VDC
2-3	+5 VDC

Table 2
Power Supply Configuration

4.4 Echoing

Echoing can be enabled or disabled by selection jumper J9. The default setting for this jumper has echoing enabled. Table 3 shows the possible connections for this jumper. Figure 4 provides the location of the jumper.

Jumper J9	Selection
1-2	Echo On
2-3	Echo Off

Table 3
Echo Configuration

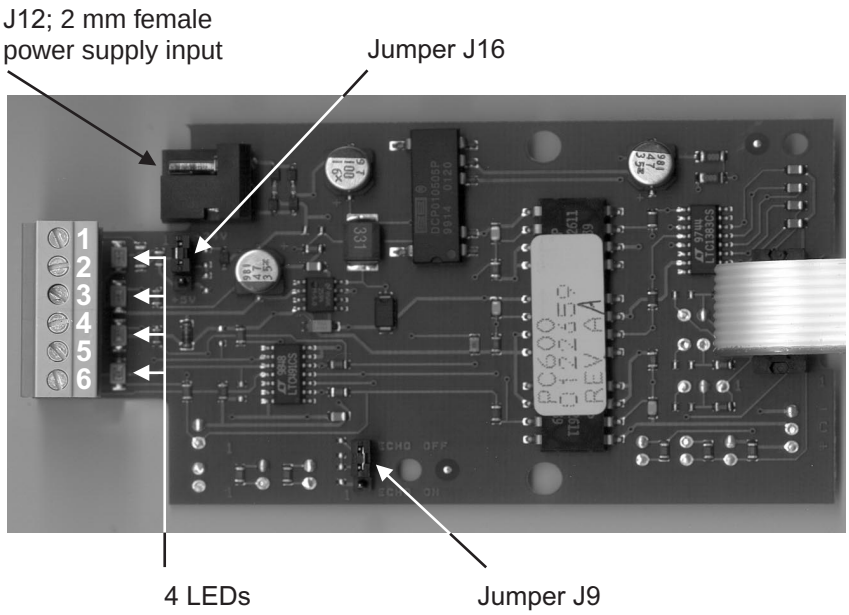


Figure 4
SIOC02 Component Location Diagram

5 Operation

5.1 Introduction

This chapter provides information on the operation of the SIOC02 Serial Input/Output Converter.

5.2 Theory of Operation

The SIOC02 module provides a half-duplex (2-wire) RS485 multi-drop connection designed primarily for use with the BERGES inverter products. All drives on the common RS485 bus must have their circuit commons (COM or CM terminal) connected. The optical isolation of the SIOC02 provides an isolation barrier between the drives and the communication host. This isolation allows baud rates of up to 110 kHz.

The transmitter for the RS485 is enabled when the RTS line is low. When the RTS line is high, data on the TxD line is reflected on the RS485 port. A high signal on the TxD line causes current to flow from SIO+ to SIO–. Data on the RS485 bus is always reflected on the RxD line, regardless of the RTS signal level.

Handshaking lines RTS and CTS are connected together internally in the SIOC02 module. No time delay is injected between asserting RTS and receiving CTS.

Handshaking lines DTR, DSR, and DSD are connected together internally in the SIOC02 module. No time delay is injected between asserting DTR and receiving DSR and DCD.

These handshaking connections are present for software or hardware that requires full handshaking. Use of BERGES software on most computers does not require the full handshaking, and operation may be accomplished by proper connection of only the GND, RTS, TxD and RxD signals.

Transmission of data is enabled by raising the RTS signal prior to sending data on the TxD line. The transmitter is enabled with 20 microseconds of the RTS assertion.

6 Troubleshooting

6.1 Introduction

This chapter provides information on using the LEDs incorporated into the design of the SIOC02 as troubleshooting aids.

6.2 Troubleshooting Tips

Table 4 presents a guide for troubleshooting a system based on the status LEDs in the system. The location of these LEDs, and their function, is shown in figure 1 and 5.

Symptom	Possible Cause	Potential Solution
PWR LED not lit	Correct power supply voltage is not present.	Check that the power supply is connected, and that it is working correctly. Check for excessive load on the power supply. Check that the power supply selection jumper in the SIOC2 is set correct for the voltage being applied.
TE LED not lit during transmit	TE command not given in source code.	Check that the TE command is being sent by the host.
TxD never comes on	No signal on the transmit line.	Check the RS232 connections (9 pin “D” shell connector). Assure that the host is putting information onto the transmit bus, and that the signal is reaching the module.
RxD never comes on	No signal on the receive line.	Check the RS485 connections to J2 and the devices connected to the bus.

Table 4
Troubleshooting Hints

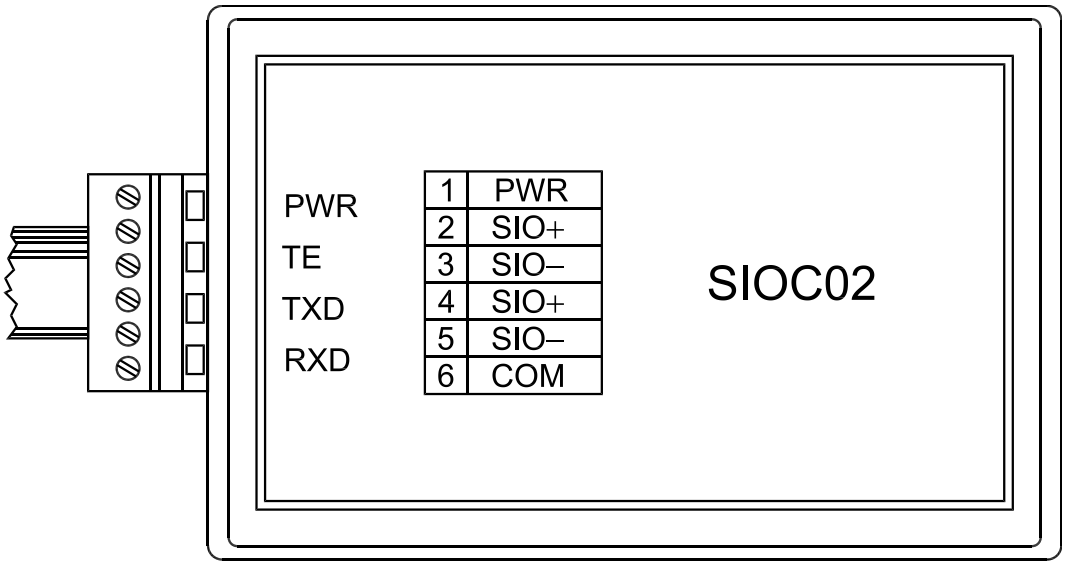


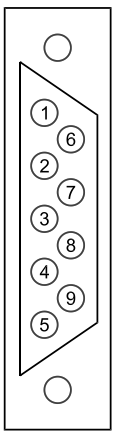
Figure 5
Location of Status LEDs

6.3 Factory Assistance

If you require further assistance with this or any BERGES Electrical product, please contact our Application Engineers can be reached at +49 2264 17-158 or +49 2264 17-160.

7 Appendix

7.1 RS232 Connection Details



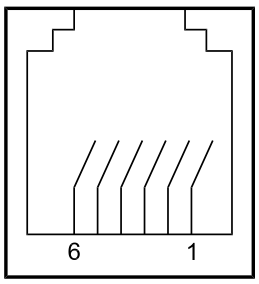
Pin Number	Signal Name
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	

9 Pin “D” Shell Connections, SIOC02 and Host

25 Pin D Shell Host	9 Pin RS232, SIOC02	Signal Name
2	3	TxD
3	2	RxD
4	7	RTS
5	8	CTS
6	6	DSR
7	5	GND
8	1	DCD
20	4	DTR

9 Pin to 25 Pin Serial Port Connections

7.2 Connections for Use with the SM1 Submirco Inverter



RJ11	SIOC02
1	
2	GND
3	SIO+
4	SIO–
5	
6	

Connections Diagram for Using SIOC02 with the SM1 Submicro Inverter

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